Project Introduction

This SBIR provides advanced, automated mechanisms for ANSPs and the flight operators to enrich and interact with IFR Preferred Routes in the U.S. National Airspace System (NAS). The FAA's Instrument Flight Rules (IFR) Preferred Route Program was developed to allow air traffic facilities to identify select routes for use into and out of busy airports and airspace. We apply automation to maintain and improve the database in real time. The resulting product, the Integrated Adaptive Route Capability (IARC), has four key innovations.

(1) Leveraging machine-learning capabilities to adapt preferred routes to current needs and historical patterns of use. These processes would run in real-time and provide automated intelligent updates of the database. Benefits include proactive and adaptive identification of preferred routes.

(2) Integration of constraint identification models to alert users to which preferred routes may be infeasible. This allows flight operators and ANSPs to choose routes among the most viable ones.

(3) Inclusion of routes or areas of operation for Unmanned Aerial Systems (UAS). The current database caters to legacy manned aircraft. The future NAS will require that new aircraft types be integrated. Part of that will be allowing them to interact with processes originally designed for legacy aircraft.

(4) Rapid access and automated information exchange with flight operators. Today, gaining preferred route information is a very manual process and requires FAA coordination to gain route approval. Customers are not provided an automated way to share and update route-information and as a result, the database suffers from antiquated and unnecessary routes in the system. Our proposed innovation allows flight operators to share with the preferred route database their versions of frequently used or preferred routes.

Anticipated Benefits

IARC benefits NASA's Traffic Aware Strategic Aircrew Request (TASAR) by delivering optimized flight trajectories as part of the flight plan and preferred routes that are pre-cleared of potential conflicts with known weather hazards.

IARC also benefits NASA through the integration with NASA's Sherlock Air Traffic Management Data Warehouse. Preferred routes can be integrated in real time into Sherlock Data Warehouse and support SMART NAS analyses and simulations.

FAA Airspace Traffic Management and Metroplex teams can keep preferred routes up to date, and support Metroplex redesign efforts. Airlines, pilots, and other companies that create flight plans can access current preferred routes to support more optimal flight filing, also have insight to weather constraints for any routes provided. UAS pilots would be able to get preferred routes with the additional insight to weather constraints.
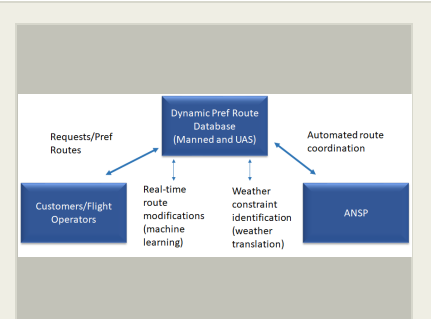
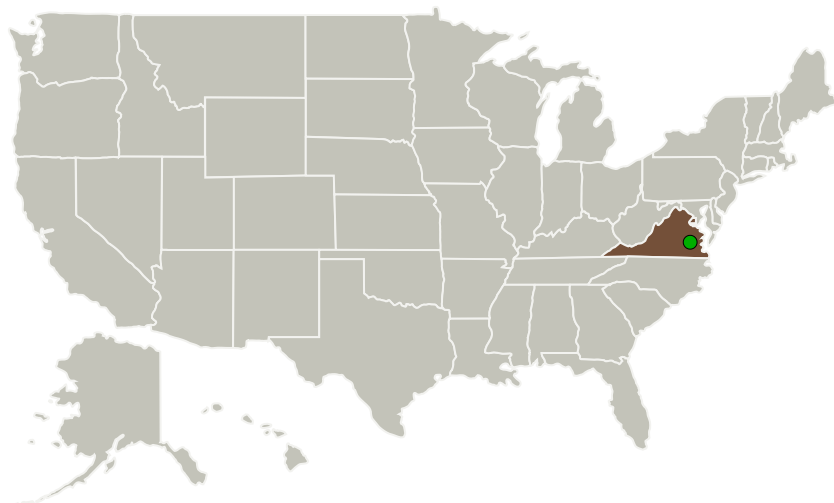Integrated Adaptive Route Capability, Phase I

Table of Contents

Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
CGH Technologies, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Washington, District of Columbia
🟢 Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
District of Columbia	Virginia

Project Transitions

▶ **July 2018:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CGH Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Edward T Masterson

Co-Investigator:

Andria Roney

✓ **February 2019:** Closed out

Closeout Documentation:
- Final Summary Chart*(https://techport.nasa.gov/file/141120)*
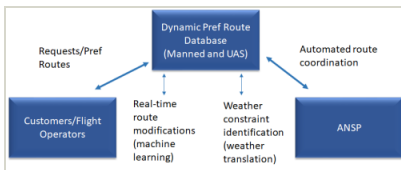
Images

Briefing Chart Image
Integrated Adaptive Route
Capability, Phase I
*(https://techport.nasa.gov/imag
e/130257)*
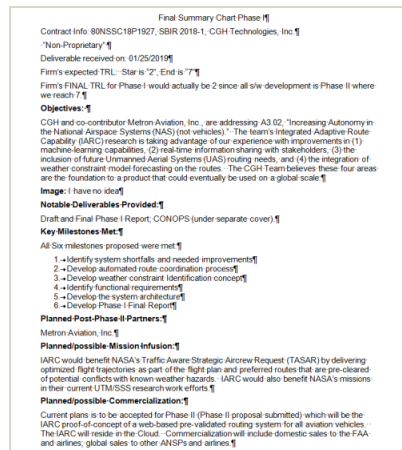
Final Summary Chart Image
Integrated Adaptive Route
Capability, Phase I
*(https://techport.nasa.gov/imag
e/126782)*

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**

Applied Research	Development	Demo & Test
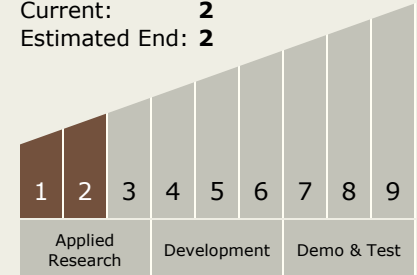
Technology Areas

Primary:

- TX01 Propulsion Systems
  └ TX01.3 Aero Propulsion
    └ TX01.3.1 Integrated Systems and Ancillary Technologies

Target Destination
Earth

TechPort

Printed on 12/14/2022
09:16 PM UTC

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/94632

Page 3